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Principles of real estate subdivision with a practical problem

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Principles of Real Estate Subdivision

with

A Practical Problem

By

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THE PROBLEM

The general principles of real-estate subdivision are herein set forth and used as the basis for the solution of a practical problem. As a rule realestate subdivisions are planned and developed as money making propositions. Thus the type of a realestate development should be governed by the class of residents to be accommodated and the portion of their incomes available for housing. The discussion gives this aspect of the subject due consideration and an effort is made to harmonize the interests of the resident with those of the development promoter and of the public.

PORTION OF INCOME AVAILABLE FOR HOUSING

Numerous economic investigations have determined that twenty to twenty-five percent is the usual proportion of a man's

income available for housing expense. This amount includes either the rent of a residence or the installment payments in buying a low-priced home.

RELATION OF LOCATION TO HOUSING COST

Housing costs, to a considerable extent, depend upon the location of the property in relation to the various urban interests. If the residence district is centrally located the resulting congestion will increase the property values to such an extent that the land cannot be used for housing purposes without a proportionally large gross return.

Desirable living conditions require lots of at least 40 by 100 feet, approximately, for each family. Land allowing this distribution is usually available within the five-cent carfare limit of our cities.

Toward the center of city activities the lots are narrowed more

and more until the house occupies the entire width of the lot and continuous apartments result. These apartments may shelter several families on lots with a frontage of 15 to 25 feet. The most extreme cases of this type of development are found in Philadelphia where a density of 145 families to the acre is frequently obtained.

Leading city planners advocate moving factories and their employees to suburban locations where cheaper land will allow industrial expansion and improved living conditions. The moving of local industrial interests to Pullman, Illinois, and to Norwood and Oakley, Ohio, provided ample factory space although housing conditions were not given sufficient consideration. #

LAND SUBDIVISION

Until quite recently subdivision work has been wholly in the hands of civil engineers. Most of our cities

#Taylor, Graham R. Satellite Cities, Survey, N.Y., 1912

have been laid out in the "gridiron" system with little or no consideration given to topography and natural features. Frequently real estate developments are made without proper study of the problem as a whole. The result is waste areas of irregular shape and inconvenient street intersections. Small "squares" and "greens" are formed in this manner, not in accordance with the principles of good city planning, but by chance.

The fundamental principles of land subdivision are:

1. The design should give due consideration to the topography and natural features.

2. The plan should have interest, good organization and design.

3. The general plan is determined by the use of the land and the direction of the movement of population.

4. Locate thoroughfares first.

5. The size and shape of lots depend on the type of dwelling to be

erected, single family, semi-detached or row apartment.

6. Increase of residence district to be accompanied by a corresponding increase of park area.

7. Harmonize interests of real estate man, prospective owner and public.

The manner of housing a population has a deep sociological bearing on the well being of the community. The housing problem is dependent to a great extent on the subdivision plan, and our success in solving the subdivision problems today will have a definite effect on the generations to come. Real estate promoters are beginning to realize the moral obligation that they owe to their customers and the community, and an improvement in real estate developments will be the result. Unscrupulous promoters are now beset on every hand by building laws and regulatory ordnances

framed to protect the individual, and what is even more important, the public.

CIRCULATION

In the preliminary study for a subdivision the roadway design is made first. Ease of access, with a minimum amount of roadway area, are the important factors in the solution of the problem. The grades must be carefully worked out as it is desirable to keep traffic ways under 3 percent and city streets under 6 percent. The informal or natural method of roadway location permits the utilization of the topography to secure more favorable grades.

Twenty to forty percent of the gross area of a subdivision is required for roadway. From the standpoint of service the gridiron system requires slightly less roadway area than the informal, although on uneven

land the latter system is usually more practical and economical. In congested districts where shallower and narrower lots are necessary a proportionally larger area of roadway is required. The cost of this increased service is charged to the lot area so property values are advanced. It is very evident that the minimum area of roadway providing ample service is the desired solution of the problem.

The streets of our cities, as originally plotted, varied from 50 to 66 feet wide. In small but rapidly growing communities a much larger reservation of road area was often made than has been justified. The unnecessarily high upkeep and the loss of land by such injudicious action have been a distinct burden to many western towns. To guard against this error streets should be constructed with a small paved surface adequate for present needs but with an ample reservation of gross roadway and an ultimate curb line

for the future maximum width of the street.

The circulation should be worked out to separate the through traffic from the service traffic. The smaller the amount of through traffic the more desirable the street will be for residence purposes. The curves of informal road design act as an automatic traffic regulator, as through traffic will select the more direct routes.

LOT AREAS

The size and shape of lot areas depend upon the type of dwelling to be erected. Row apartments require a deep narrow lot while single family houses are built on wider areas. Lot sizes are given a remarkable range in modern subdivisions. The number of families to the acre usually varies between four and thirty-four. Aside from tenement conditions Philadelphia has many of our worst examples of congested

housing. There two families are frequently accommodated on lots 15 by 40 feet, representing a density of one hundred forty-five families to the acre. For housing laboring men it is generally accepted that eight families to the acre is a very comfortable allotment. This provides ample space for a single family home and garden. In the recent Chicago City Clubs' subdivision competition the housing density averaged fourteen families to the gross acre. This degree of density was secured by relatively narrow roadways, continuous apartments and community recreation areas.

Common practice and local requirements are producing a standard depth for city lots in our larger cities.

New York--100 feet, best for convertibility.

Chicago---125 feet, except in poorer residential sections.

Kansas City---125 feet, a reduction in size from former practice.

Berkeley, Cal.---100 feet used in ideal re-arrangement.

The standard of 100 feet for New York City has been recognized for over one hundred years. The convertibility of residence lots to business uses is seriously impaired by a depth of over 125 feet, due to the resulting waste areas. Philadelphia has suffered severely in this way from a lack of lot standards. Alleys have been transformed into secondary streets to secure additional building frontage. It has been suggested, from observations in Philadelphia, that this principle may be used to advantage. Lots originally 225 feet deep may be divided transversely by a fifty-foot street to secure a doubled frontage on 87 1/2 foot lots.

PLAYGROUND AND RECREATION AREAS

The health and happiness of the residents of any particular housing development depend, to a certain measure,

upon the facilities for play and recreation. The ideal arrangement consists of ample home grounds with supervised play areas and public parks near at hand. In densely populated districts the home grounds are necessarily smaller and community recreation areas are relatively more important and should therefore be larger in area or more frequent in location. Well organized cities strive to provide recreation areas, within a quarter mile radius throughout the residence districts, which may be reached without crossing a traffic way.

Home gardening offers a most desirable form of recreation. In England the home garden has met with such favor that in many industrial housing developments the tenants are required to maintain gardens. The sale of garden products offers a desirable means of increasing the family income, in addition to the saving by providing a part of the food for the family. Where row apartments are used

and land area is limited, the garden space is apportioned by allotment to persons who will properly use the land. In this country it is doubtful if gardening in congested districts would prove successful. A better use for the land would be a common recreation area under the control of the community.

RESTRICTIONS AND EXCLUSIVENESS

Numerous restrictions are imposed upon purchasers of property in the various garden suburbs throughout our country. These restrictions are stated in the deed to the property and constitute a contract perpetually binding upon the owner. These conditions regulate the cost and type of house to be erected, locate the building on the lot, forbid the planting of undesirable trees and shrubs, etc. The community as a whole is protected by the exclusion of saloons, "movie" shows, stables,

alleys, retail merchants and other undesirable features. The popularity of these exclusive districts is shown by the readiness of purchasers to pay a substantially higher price for restricted property than the same improvements would sell for in an unrestricted development. The extra cost in this case assures desirable neighbors and pleasant surroundings.

CONVERTIBILITY OF THE SUBDIVISION

A large proportion of the area of our cities is now used for purposes for which it was not originally intended. The first buildings erected in any given locality are usually residences and the land is divided for this purpose. As the growth of the town proceeds, more and more of the residence portion is engulfed by business interests. Thus the original residence type of subdivision is required to serve for shop and office building sites. The ease with which this

change is made determines the degree of convertibility of the layout.

Many very undesirable features have resulted from the inadaptability of the original residential layout to other and more expensive purposes. A large portion of the business district of Boston still retains its original subdivision. The city has gained in individuality, but lost by the inefficient use of a valuable land area. Building lots in Philadelphia were originally 150 feet deep. Business interests finally made use of the frontage, and in the excess interior courts thus formed developed the lowest and most congested types of tenements. If the original lots had been made shallower, say 100 feet, the formation of the interior courts would have been impossible.

In the case of the cities just mentioned a re-subdivision of the unsuitable land should have been made. Such reconstruction is very costly although

the elimination of undesirable conditions would have gone a long way toward making up the expense. Wide roadways with buildings set back and ultimate curb lines established will greatly aid the cities of the future in the efficient use of land.

BUILDING ZONES

For the efficient utilization of the total area of a city it should be divided into zones. This districting may be by bulk or by use. When the zones are established by bulk the height of buildings and proportion of building area are regulated. Districting by use locates the various interests,- industrial, business and residential and prevents their encroachment one upon the other.

The older portion of a city is usually designated as Zone One and measures are taken to prevent undesirable conditions. In other portions of

the city development of the interests and the direction of their growth may be controlled. Districting gives unity and character to the city plan and provides boundaries for the enforcement of regulations. An increase in property values will result after the adoption of a zoning scheme.

THE HOME

The requirements for an ideal home are clearly set forth by the National Conference of Charities and correction, Cleveland, 1912, as follows:

"Social welfare demands for every family a safe and sanitary home; healthful surroundings; ample and pure running water inside the house; modern and sanitary toilet conveniences for its exclusive use, located inside the building; adequate sunlight and ventilation; reasonable fire protection; privacy; rooms of sufficient size and number to decently house the members of the family;

freedom from dampness; prompt, adequate collection of all waste materials. These fundamental requirements for normal living should be obtainable by every family, reasonably accessible from place of employment, at a rental not to exceed 20 percent of the family income."

There are three types of houses used in real estate developments, the single, the double or semi-detached and the row apartment.

Mr. Owen Brainard, architectural adviser for the United States Steel Corporation, lists the following considerations as determining factors in the type of house to be erected:

1. "Density of population. This is determined by the relation of the centers of employment, property values and transportation.

2. Land cost. This vitally reacts upon the first.

3. Tenant's income. This must be considered in regard to food cost,

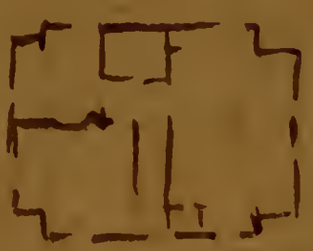
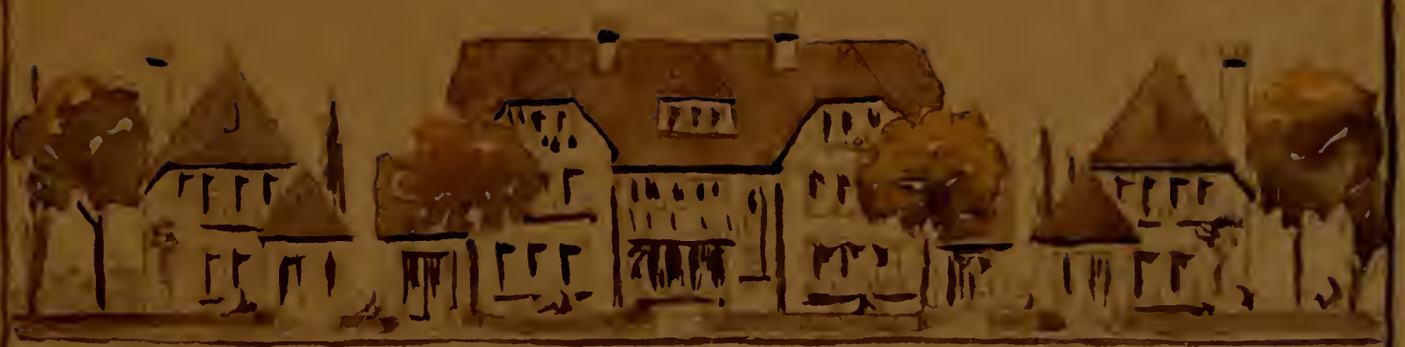


PLATE 2



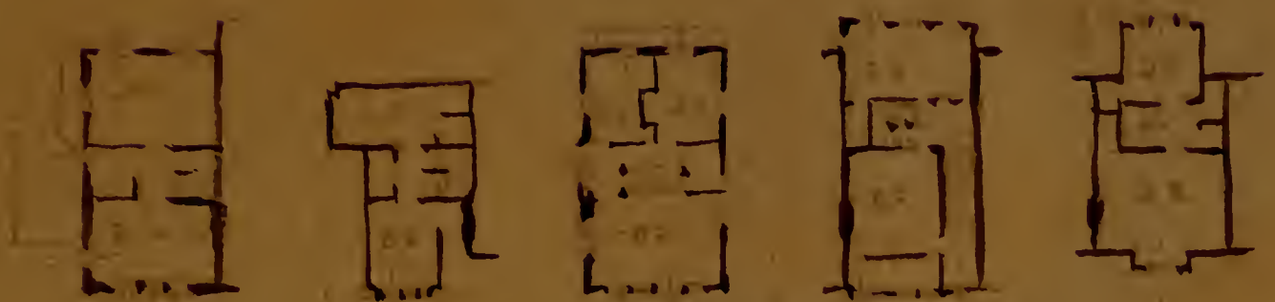
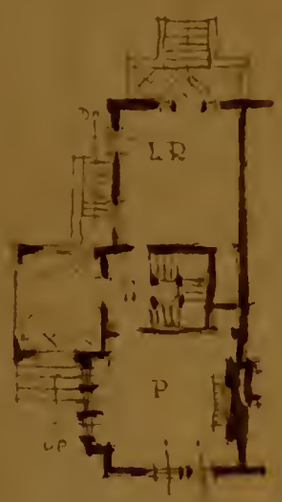


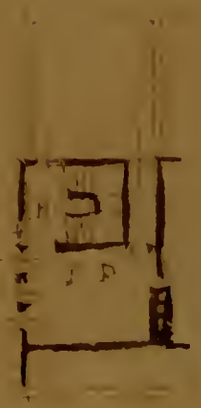
PLATE 3

ROW · APARTMENT

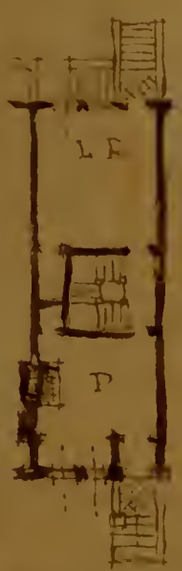


FIRST FLOOR PLAN

SECOND FLOOR PLAN
TYPICAL END HOUSES

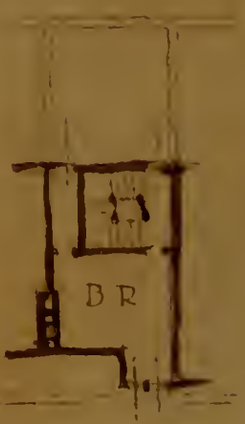


THIRD FLOOR PLAN

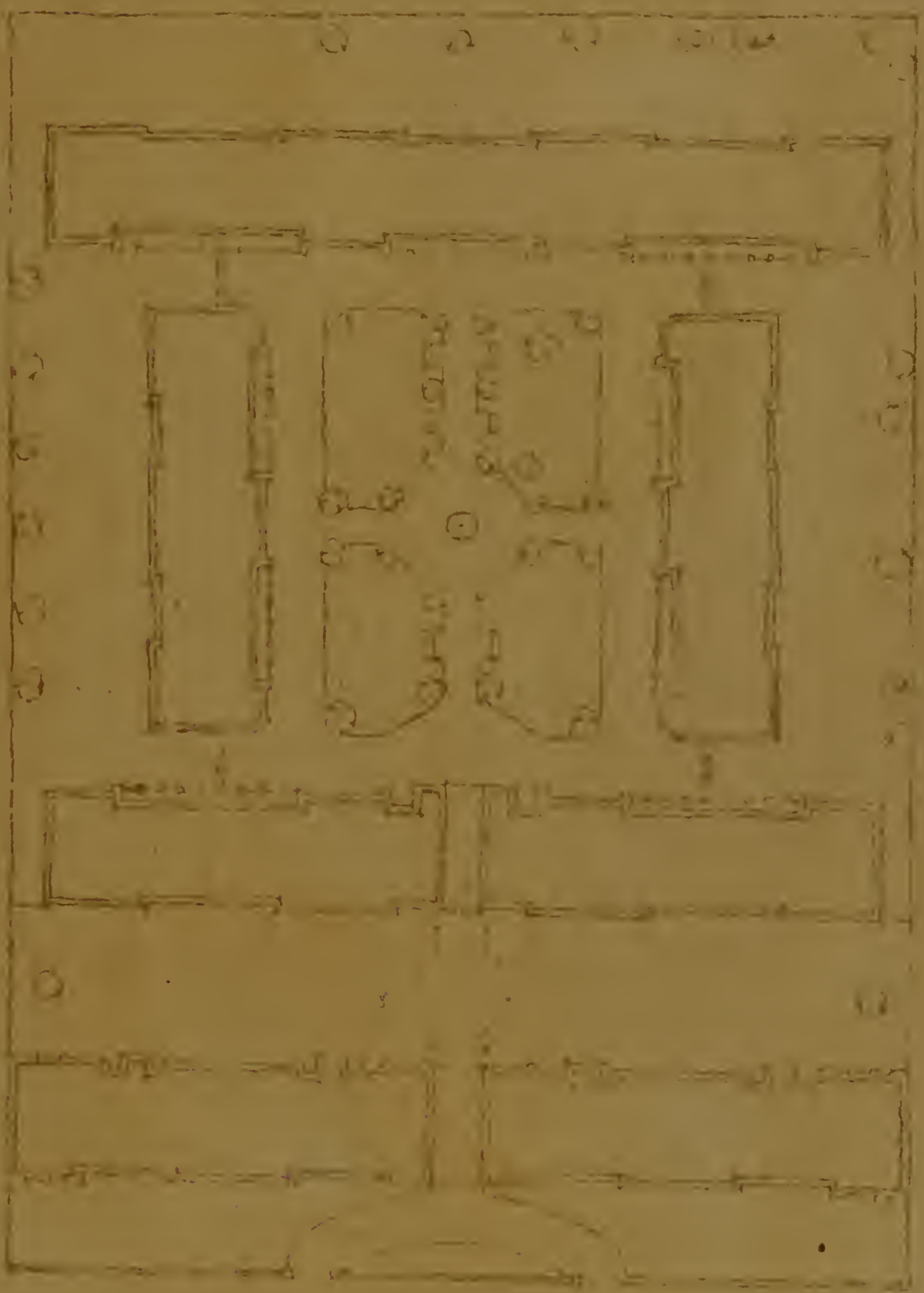


FIRST FLOOR PLAN

SECOND FLOOR PLAN
TYPICAL INTERIOR HOUSES



THIRD FLOOR PLAN



~ Calthorpe Estate. London ~

~ Dev. Adjustments Above Courts ~

transportation cost and other living expenses.

4. Plan.

5. Materials and methods of construction.

All of these factors must be correlated and the result of these correlations must be considered in relation to the return upon invested capital or interest."

If a married man is given a choice of the different types of houses he will invariably select the single family dwelling. The single house (Plate 1) allows a desirable degree of privacy and individual control of the premises. However, from the economic standpoint the single residence is the most unsatisfactory. It requires more ground and the expense of construction is greater, for a corresponding size, than the other dwelling types.

The semi-detached dwelling (Plate 2, Center House) offers a more

economical type with only a small reduction of privacy. There is considerable saving in land area as each half of the structure is on a lot line leaving the yard space all on one side. Also the construction, plumbing, pipe connections, etc. may be made much more economically for a double house. If walls or hedges are placed on the lot lines a fair degree of privacy may be secured. This type of dwelling is usually rented.

The continuous or row apartment (Plate 3) offers the greatest housing capacity for the least land area and money outlay. Lots 15 to 25 feet wide are suitable for this purpose. With the wider lots two families may be accommodated on two floors. Houses of this type are usually placed close to the street with an area at the rear for gardens. Monotony of the apartment front may be avoided by providing porches, plantings and slight differences of architectural details.

An example of this type of structure built at Forest Hills Gardens, L. I., is shown on Plate 3.

The densest housing is secured by placing row apartments about interior courts. This mode of housing is very prevalent in Europe but so far has not gained a foothold in America. (See Plate 4). A very good effect may be obtained by grouping single and semi-detached residences about small courts. This method (Plate 2) is more desirable, both from the housing and esthetic standpoints than the use of the row apartment.

MATERIALS OF CONSTRUCTION

Of the variety of suitable building materials wood leads in popularity, with stucco a close second. Brick has proved its value as a building material through countless centuries. Very artistic effects are being obtained with the new styles of fancy finish and tinted brick. Hollow tile and other burnt clay products are coming into more extensive use for

fire-proofing and permanent construction. Stone is an excellent material but relatively expensive due to its great weight in transportation and the amount of labor involved to prepare it for use. The latest development toward cheap and durable construction is the poured cement house. Stock forms are erected and the complete house shell, with floors, partitions and roof, is made by the single operation of pouring in the liquid concrete. A number of six-room houses were built by this method by the Delaware and Lackawanna Railroad Coal Company at Nanticoke, Pa., at the remarkably low cost of $1,160 a unit. These houses rent for $8 a month and are said to make a very pleasing appearance.

At Forest Hills Gardens, Long Island, experiments have been made with large concrete units and very satisfactory results obtained. The production of these units by modern factory methods, with the elimination of wastage, at some point near

the building site should provide a very satisfactory means of construction. Mr. Grosvenor Atterbury, the architect developing this type of construction, claims that construction costs and time are considerably reduced.

IMPROVEMENTS

A great number of improvements are necessary before the raw land is ready for building operations. The streets must be paved, sidewalks made, sewage and drainage cared for, water, electric and gas service lines installed, and the usual grading and ornamental planting completed. The type of development contemplated will have a great influence on the cost and extent of these improvements.

The width of city streets has been reduced from year to year until the desirable reservation for residence districts is placed at 40 to 50 feet. The paved area is usually between 16 and 24 feet wide with four foot sidewalks. These dimensions provide an ample parking space

for roadside planting. Cross sections of roadways proposed by the author for a development in the Country Club District, Kansas City, are shown at the top of the first plan.

An ample sewer system is a recognized necessity in the modern city. If there is a considerable amount of surface drainage to care for, storm sewers will be necessary as well as the sanitary system. In case both systems are to be installed a considerable saving can be made on construction by placing them in a single excavation, the sanitary line being run at a lower level. Sanitary sewers are often placed on the rear lot lines, thus saving the street from mutilation when connections are made. Tile pipe is used for sewage construction except in the case of unusually large sizes which are made of brick or concrete.

LANDSCAPE PLANTINGS

No other feature adds so much to the home-like appearance of a residence as artistic horticultural treatment. Roadside tree plantings give charm and individuality to city avenues. Both the formal and informal methods are used for roadside planting although the former is more suitable for city conditions. Characters that should influence the selection of trees and shrubs for ornamental purposes are: adaptability to local condtions, freedom from pests and diseases, length of life and individual beauty. The planting of objectionable trees is often prohibited, as Ailanthus on account of poisonous foliage and Willows for their root interference with drain pipes.

The J. C. Nichols Investment Company of Kansas City allows an expenditure of one percent of the selling price of a property for its landscape improvement. No doubt this small investment brings a return of many fold when the property is sold.

THE ORGANIZATION

The success of any housing enterprise depends to a great extent upon the efficiency of the organization in charge of the development. The more important types of organization dealing with housing problems are as follows:

1. The realestate investment company,--primarily for profit.

2. Co-partnership,--with a definite maximum return on the investment and an opportunity for the tenant to have an interest in the corporation.

3. Paternalistic,--a branch of an industrial unit for the housing of its employees.

4. Philanthropic,--the success of the development due to the magnanimity of interested parties.

The real estate investment company is by far the more common form of organization engaged in housing development. The term development, in this case, is probably more applicable than improvement. Our most

distressing and on the other hand many of our most pleasing housing developments have been made by this type of organization. The primary incentive is profit, and the unscrupulous manner in which such companies have sometimes operated has resulted in an often unjust attitude regarding them. The Country Club district of Kansas City, and Roland Park, Baltimore, are pleasing examples of the work of this type of organization.

The Co-partnership plan has been very carefully worked out in England and remarkably satisfactory results obtained. Mr. Henry Vivian, in speaking of The Pioneer Co-partnership Village, Ealing Tenants Ltd., England, states the following advantages of this type of organization from the tenant's standpoint.

1. "He gets a house at a rental which, if accommodation and other things are compared, is not higher, and is probably less, than he would have to pay elsewhere.

2. "He can invest in the society, of which he is a tenant, any savings he finds it possible to make out of his earnings, at 5 percent.

3. "Should values go up he gets the benefit either by way of a dividend on the rent, or by paying a rental which is below the market value.

4. "He secures practically all surplus profits after the fixed charges have been met.

5. "He secures a social atmosphere which awakens new interests, and creates a collective friendship unknown under the system of individual ownership.

6. "He secures freedom from loss, should circumstances require him to leave the neighborhood.

7. "The capital for building his house is provided at a cheaper rate than it could be obtained on any other system that is commercially sound.

8. "The tenants as a whole can relieve themselves of dependence on outside capital altogether acquiring through investment or by accumulated capital, the value of the property."

A prospectus based on the English plan but adapted to American conditions is as follows:

Co-partnership Housing for American Cities

"The objects of a Co-partnership homes company may be summarized as follows:

1. "To promote the economic erection, co-operative ownership, and administration of healthful homes in attractive surroundings, at sufficiently low cost to be within the reach of all who desire to improve their home conditions.

2. "To avoid the dangers that too frequently accompany the individual ownership of houses and speculative building.

3. "To harmonize the interests of resident and investor by an equitable use of the profits arising from the increase of values and the careful use of

property.

4. "To provide an opportunity for gardening under instruction, thus maintaining the home in part through the use and sale of products.

"The procedure after funds are in hand will be to acquire suitable property accessible to the city, and build substantial, sanitary, and convenient homes. The district will be planned along advanced garden suburb lines, restricting the number of houses per acre and providing allotments for gardening, community playgrounds and other social activities. Economies will be effected through wholesale operations and the elimination of speculative profit.

"A prospective resident must be approved and must take up two shares of Common Stock. He will pay a reasonable rental, and share all surplus profits. Dividends on rent and Common Stock will be credited in Common Stock until the value of twenty shares is reached, outside capital being gradually retired.

The cost of repairs will be deducted from the twelfth month's rent, and the remainder remitted, thus further encouraging care in the use of the property. Common Stock may be drawn upon for arrears or repairs due to neglect. The resident can invest his savings in the Company at five percent.

"The directors will ultimately be elected by the Common Stock Holders, but Preferred Stock will be represented until Common Stock is about one-half paid up. Shares will be 500 Common and 1500 Preferred, of $100 each. Common Stock shall be paid not less than 10 percent upon allotment and installments of $1 per month per share. Dividends shall not exceed five percent. Preferred Stock shall be paid in full; dividends not to exceed five percent cumulative. It may be retired at par on a year's notice. First mortgages at five percent will be placed on completed houses up to sixty percent of their value.

A reserve fund will be established after Preferred Dividends are paid, at a rate of one percent per annum, until it equals the value of the outstanding stock. With 2000 shares subscribed 250 houses can be built.

"To the investor the Company by collective responsibility offers an exceptional security, it being to the residents' interest to care for the property, find tenants, and pay rent promptly." #

The housing of employees by the Pullman Steel Car Company of Pullman, Illinois, offers a very good example of paternalistic organization. The housing was originally administered by a branch of the Pullman Company and so evidently in the interests of the company that the rights and desires of the employees were ignored. Unsatisfactory conditions arising were accredited to the company and

#Nolen, John. More Houses for Bridgeport. Report of Chamber of Commerce, Bridgeport, Conn. 1916.

resulted in an antagonistic feeling between employer and employee. It is now recognized that paternalism is not conducive to content in a community and that the better plan is to place industrial housing in the hands of an outside organization.

Port Sunlight, a beautiful garden city near Liverpool, is perhaps the best example of philanthropic housing. This development was built by the Lever Brothers, soap manufacturers, at a cost of $1,700,000 to house their employees. The scheme is not self-supporting as the rents are insufficient to cover expenses, but the Levers consider the efficiency of their employees to be an ample return. However, as housing is usually a business proposition, we can hardly expect city life to be revolutionized by kind hearted employers.

PRIVATE OWNERSHIP

Although numerous examples of the work of these various housing

organizations may be found, by far the greater portion of our population is housed in structures erected by individuals. In the case of a man building his own home financial assistance is usually furnished by a building and loan association, the local bank or private capital.

The question has been raised as to the desirability of all working men owning their homes. A man earning $25 a week can well afford to purchase a home and he usually plans to do so.# However, with the vast army of workers earning less than $15 a week it is a very different matter. We have already too many instances of working men "owning" a home after making a $25 payment, and then slaving for the remainder of their lives to lift the mortgage. An amortization table in the Fourth Annual Report of the Massachusetts Homestead Commission shows that 28 years of $15

#Mass. Homestead Commission, Rpt. 4:10 1916.

monthly payments are required to purchase a $2000 home and keep up the 5 percent interest, plus taxes and insurance. The average life of a well constructed frame building is usually placed at fifty years. Thus, after 28 years of purchase installments and upkeep expense the value of the original investment has decreased over 50 percent and during this period the owner is liable to a total loss through inability to keep up the payments. In the case of low paid workmen the purchase of a home would be uneconomical as the owner would be obliged to make severe sacrifices and the resultant lower standard of living would tend to produce slum conditions throughout the neighborhood.

COSTS

John Nolen, in a paper read before the Fifth National Conference on Housing, set forth the following facts regarding the housing of low paid workers:

1. "A minimum desirable house of 4 or 5 rooms cannot be provided in the United States, even under favorable conditions, for less than $1,800 or $2,000 -- that is, for house and lot, with street improvements, essential public utilities and neighborhood recreation.

2. "A house costing that sum cannot be offered on a basis of economic rent of, say, 5% or 6% net, for less than $15 per month.

3. "Unless a wage earner with a normal family of wife and three dependent children has an income of $14 a week, or $800 a year, he cannot afford to pay as much as $15 a month for rent.

4. "More than one-half of all workingmen receive less than $15 a week."

The problem of building cheaper homes for low paid workmen may be attacked from several different angles. Various projects already in practice have made great strides toward the satisfactory solution of this housing problem.

1. Wholesale building operations. Nothing can be more uneconomical than the preparation of plans, and accumulation of labor and materials for the construction of a single building. In modern shop practice, where standardization has been developed to a high degree, such a course would seem ridiculous. When several houses are desired substantial economy is made possible by the use of a small number of similar plans, purchase of materials in quantity and the maintenance of an efficient building force. The Kenosha Homes Company, of Kenosha, Wisconsin, is building 400 low priced homes by this method.

2. Co-partnership. The economic principles of this sytem are low maximum returns on investment, collective responsibility and financial interest of tenants in scheme, and large scale building operations. The Billerica Garden Suburb, Inc. is developing 50 acres near North Billerica, Mass., along co-operative garden city lines.#

#Co-partnership Housing for American Cities, p. 21

3. New types of construction.

Experiments with poured concrete as a building material are bringing very satisfactory results. The Delaware and Lackawanna Railroad Coal Co., Nanticoke, Pa., has built a number of semi-detached houses at a cost of $1,160 for six-room single family accommodations. This is not over one-half of the cost of similar accommodations provided by usual building practice. Low priced single and double houses have been built with hollow tile by the Lehigh Coal and Navigation Co., Hauto, Pa. Where clay products may be secured near by tile should prove an economical building material. The Sage Foundation has made some interesting experiments at Forest Hills Gardens in the use of large concrete blocks for the construction of high grade homes. With the pressing need of cheaper buildings and considering the activity of investigation toward that end, it is safe to predict that American ingenuity will soon solve the problem.

Construction costs vary considerably throughout the United States, although there is a certain degree of constancy for the larger sections. The following statement gives the estimated cost of improvement of a 3.72 acre tract on Parker Street, Lowell.#

ESTIMATE

1.	Survey and bounds, 3.72 acres at $20 ----	$ 74.40
2.	Clearing 3.72 acres at $40 ----------	148.80
3.	Sewer pipe, 6-inch, 1,209 linear feet at 50¢ ----------	604.50
4.	Sewer pipe, 8-inch, 410 linear feet at 65¢ ----------	266.50
5.	Manholes and catch basins, 6 at $50 -----	300.00
6.	Drain inlets, 2 at $15 ----------	30.00
7.	Water pipe, ¾ inch, 346 linear feet at 50¢ ----------	173.00
8.	Roadways, 1,399 square yards at $1.10 ---	1538.90
9.	Curbs, 105 linear feet at 75¢ ----------	78.75
10.	Sidewalks, 881 square yards at 80¢ ------	704.80
11.	House walks, 181 square yards at 80¢ ----	144.80
12.	Street trees, 33 at $1.50 ----------	49.50
13.	Fences (in rear) 1,400 linear feet at 25¢ ----------	350.00
14.	Grass areas, 14,135 square yards at 3¢ --	424.05
		$4888.00
15.	Overhead expense, 15 percent	733.20
	Total cost of improvements	$5621.20

Total per house	$175.66
Total of land per acre	2178.00

#Mass. Homestead Commission, Report 4, 1916.

Area in roadway including one-half external streets, 21.1 percent.

This allows a density of 7 families to tne acre.

The roadways are to be of bituminous macadam and sidewalks of asphaltic concrete.

Estimates cover all items except the construction of the houses which are to be single and semi-detached at an average cost of $1,650 a family.

A tabulation of data regarding the type and cost of housing as furnished by the more important developments is given in Table #1. From this data s schedule has been worked out, Table #2, showing the relation, in actual practice, of wage to home value, rent and accommodations. The only break in the gradual ascent of the curve of cost is caused by the remarkable results obtained with poured concrete construction.

TABLE #1

DATA ON EXISTING HOUSING DEVELOPMENTS

Location	Rooms	Rent	Weekly Wage	Value of property	Lot Area	Type of Dwelling
Pullman Steel Car Co., Pullman, Ill.	2	$5	$12			Apartments
	4	8	16			Apartments
	5	10	18			Apartments
Midland Homes Co., Midland, Pa.	5-6	20-		$2500 to	50x120	Stucco &
	-7	22		3400		Frame
	5	14		1900	50x120	Poured Concrete
	10-	44-54		5400 to	50x120	Semi-detached
	14			6000		Stucco
Norwood, Ohio	3	12-20				Apartments
	4	15-25				Apartments
	5	20-40				Apartments
	5	20-25			25x100	Single Houses
	6	25-32			35x100	Single Houses
	7	30-35				Single Houses
	8	35-50				Single Houses
Goodyear Heights, Akron, Ohio	6			3000	50x110	Single Stucco
Norton Grinding Co., Worcester, Mass.	6			3280	50x80	Single Stucco
Kenosha Homes Co., Kenosha, Wis.	5			1750	50x120	Single Frame
	6			2500	50x120	Single Frame
Salem Rebuilding Trust Salem, Mass.	4	15		1991	25x80	Semi-detached Brick
Mt. Union Refractories Co. Kistler, Pa.	5	10		1200	80x100	Semi-detached Frame
Delaware & Lackawanna R.R., Nanticoke, Pa.	6	8		1160	70x130	Semi-detached poured concrete
Typical 4 Room House, Philadelphia, Pa.	4	13		1750	15x41	Apartment, continuous brick

Table #1--continued

Location	Rooms	Rent	Weekly Wage	Value of property	Lot area	Type of dwelling
Scovill Mfg. Co., Waterbury, Conn.	6			$2750	16x75	Apartment continuous brick
Ellen Wilson Homes, Washington, D.C.	5	$17		1608	14x95	Apartment continuous brick stucco
Improved Housing Association, New Haven, Conn.	4	12		2950	22x70	Apartment continuous stucco
Cambridge Dwelling House Co., Cambridge, Mass.	4	17		1910	40x80	Semi-detached Brick

TABLE #2

RELATION OF WAGE TO HOUSING

Weekly Wage	Home Value	Rent	Rooms	Lot Area	Families per acre	Type of Home
$8	$1000	$7	2	7.5x50	120	Continuous Apartment 1 of 2 floors
10	1300	8	2	12.5x55	63	Continuous Apartment 1 of 2 floors
to	1500	9	3	25x55	32	Continuous Apartment 1 floor only
	1600	10	4	20x60	35	Continuous Apartment 2 floors
$12	1700	12	4	25x60	29	Continuous Apartment 2 floors
to	1800	14	4	25x70	25	Continuous Apartment 2 floors
14	1900	14	4	25x80	21	Semi-detached
	2000	15	4	25x90	19	Semi-detached
	2100	15	4	25x90	19	Single House
to	1160	8	6	70x130	4	Semi-detached poured concrete
16	2000	15	5	25x90	19	Continuous Apartment 2 floors
18	2150	16	5	30x100	14	Semi-detached
20	2400	18	5	40x100	11	Single House
25	3000	22	6	50x100	9	Single House
30	3500	26	7	60x100	7	Single House
35	4000	30	8	60x120	6	Single House

Knowing the weekly wage rate it is easy to determine the cost and the type of housing accommodations that may be economically provided. Business practice has proven that there should be a gross return of at least 9 percent to realize a net income of 5 percent on the original cost of rented property. The difference, 4 percent, is required for repairs, taxes, insurance and administration.

To determine the cost and type of housing accommodations suppose we take a weekly wage of $15. From this amount one-fourth of the annual income, or $180, should be available for housing. This amount should represent 9 percent of the cost of the original investment, $2,000. The usual ratio of value of land to cost of house would allow $400 for the lot and $1,600 for the building. This allowance for land would give a lot of approximately one-tenth of an acre, with an additional 21 percent of area for roadway, at 5 cents a square foot, and $175 for improvements

(see preceding estimate statement) with a balance of several dollars. Modern 4 room single or 5 room semi-detached houses of good construction and design can be built for $1,600. (See estimates and specifications, Fourth Annual Report of the Homestead Commission, Boston, Mass. 1916.)

PRACTICAL PROBLEMS

A real estate subdivision study is incorporated with this thesis as a practical contribution. During the summer of 1916, while connected in a landscape gardening capacity with the organization developing the Country Club District of Kansas City, Mo., I was given the opportunity to work out a subdivision for a tract owned by the company. A careful study of the area was made at that time and several photographs taken of the natural features. The detailed plans for this subdivision were worked out by the writer as a part of his assigned studies

in the Department of Landscape Gardening at the Massachusetts Agricultural College. This tract consists of about 20 acres of rolling land located four miles south of the shopping center of Kansas City. Although considered suburban the property in question is well within the city limits and surrounded by boulevards and residence developments.

The subdivision is to be developed to accommodate property owners of moderate means. The type of residence desired will cost $3,500 to $5,000 including the lot. There is a similar development at present extending westward from Oak Street. A number of residences will be constructed by the company on scattered lots to set the style of improvement although the plan will be to dispose of the lots and allow the owners to erect their own homes.

The preliminary plan of the layout was submitted to Mr. Nichols in March.

He referred the study to his landscape advisers, Messrs. Hare & Hare, for comment. The plan was returned to me with their approval. A copy of the plan was also sent to Dr. Nolen, a city planner of Cambridge, and his comments were also favorable. If the finished plans are accepted by Mr. Nichols they will be used in carrying out the development of the tract.

March 10, 1917

Mr. J. C. Nichols,
911 Commerce Building,
Kansas City, Missouri

Dear Mr. Nichols:

Herewith is submitted a report to accompany the preliminary plan of the subdivision which is being mailed under separate cover. A blue print is provided on which to record any desired changes. I will be very thankful for any suggestions that you may care to make. I wish to work out a thoroughly practical subdivision even though it may never be used. Please return this plan as soon as convenient and I will work out the features, road profiles and various details.

Very sincerely yours,

(Signed) Irving C. Root

PRELIMINARY REPORT

The location of the tract treated in this subdivision study should prove very favorable from the real estate point of view. The high class development on the west, excellent street car service and with Oak Street, one of the city's most direct arteries of travel, along one side, should all prove valuable factors in the profitable sale of property in this subdivision.

Topography

The topography is unusually pleasing as it is rolling enough to form a marked contrast to the average prairie country of the Missouri Valley. The land slopes up from the east, north and west at a grade of 5 to 10 percent, forming an almost flat table in the south central portion of the area. This form of the topography gives a very good opportunity for working out an interesting design of

Photographs of "Fair View" Sept., 1916.

Looking south-east from Oak Street at Fifty-fifth Terrace.

Looking north-east from Oak Street at Fifty-sixth.

Looking south up Cherry Street from Fifty-fifth.

Circulation

As this subdivision is primarily intended for a quiet residence district, direct and heavy traffic is discouraged as far as possible within the boundaries. While the diagonal entrance roadway from Fifty-fifth and Oak offers easy access to the tract it is narrowed to fifty feet to discourage undesirable traffic. The interior roadways are located as far as possible to fit the contours and to obtain easy grades with a minimum of cut and fill. The continuation of Cherry Street between Fifty-fifth and Fair View Road is reduced to a width of forty feet as it is comparatively steep, 7-8%, and will serve chiefly as a service drive for the bordering lots. The forty foot oval drive, with its generous intersection areas, should prove both ample and interesting. An interior court was developed between sections three and four to open up a very desirable group of lots. The court should prove very popular as it is quite exclusive

and the lots have excellent drainage with no direct north frontage. A path gives easy access to Holmes Street.

Lots

The lots will average about 120 feet deep with a 50 foot frontage. The corners and better locations were favored and the dimensions of the outside and north fronts diminished to provide a reasonable variation of prices. A building line, 25 to 50 feet from the front, is indicated, with an occasional 20 foot line on some of the corner lots. Perhaps it would be well to provide a maximum or rear building line also.

Features

There a number of possibilities for developing interesting features. The diagonal corners at Fifty-fifth and Oak may be made the location of a distinctive entrance feature. In the center of section number five there is ample room for a play park, community tennis court or garden.

The development of the court offers good architectural possibilities.

The proposed layout is far more practical than the regular parallel street method for this particular area. The curved roadways reduce the grades, present a more pleasing panorama and practically eliminate north fronts. The area of roadway is less than one percent more, compared with the total tract, than would be required for the "grid-iron" style of layout. Seventy-five percent of the total area is available for lots.

Discussion of Plans

The area treated in this subdivision, including one-half of the exterior streets, consists of 19.45 acres. After provision for ample circulation service the remaining area, 14.91 acres, was divided into 105 lots with an average area of 6,079 square feet. This provides a liberal distribution, in single

houses, of 5.4 families to the gross acre.

The following table shows the disposition of the area:

Lots	73.44%	
Tennis Park	1.14	
Entrance Feature	.55	
Total Area of Sections		75.13%
Paving	11.13%	
Parking	9.01	
Walks	4.73	
Total Roadway		24.87
		100.00%

Two large plans of the subdivisions are submitted showing the completed study. The first is a sketch plan locating the roadside plantings, features, etc., and may be used for publicity in the sale of the property. The second plan gives such construction details the location of all circulation, sewers, lot lines, building lines, etc. Sketches at the top of the first plan show the entrance feature and typical road sections. There is a profile of Fair View Road, the feature drive.

Fifty-fifth Terrace was given a width of 50 feet to care for the additional traffic that will result from the opening up of the land to the south. A profile is included in the plans showing the existing and proposed grades of Fifty-fifth Terrace and Fair View Road.

The entrance feature at Fifty-fifth and Oak Streets will consist of two columns placed in the parking on each side of the road. Smaller columns will be placed inside the sidewalks and curved walls will extend to Fifty-fifth and to Oak Street. Rough quarry rock laid dry will be used for construction. Cut stone panels, bearing the name of the subdivision, Fair View, are to be set into the tall pillars. These as well as those beside the walk will support large lamp gloves. This rough type of wall with artistic plantings will give a very pleasing effect.

A community tennis court is provided for a number of families of

Section 5. A giant stride, swing and two sand boxes are for the use of the small children. The vine covered pergola terminating the park will make an impressive picture from the Fair View Road. A privet hedge will border the playground.

Cost Estimate of Improvements

Paving, Tarvia Macadam, 10,766 Sq. Yds. @ $1.25			$13,457.50
Sidewalks, Concrete, 4,569 Sq. Yds. .60			2,741.50
			$16,199.00
Sanitary Sewer			
Tile Pipe, 8", 2,326 ft. @ $1.00		$2,326	
Manholes, 7 @ $25		175	
Tile Pipe, 10" 1,920 ft. @ $1.00		1,920	
Tile Pipe, 8" 950 ft. @ $1.00		950	
Manholes, 12 @ $25		300	
		$3,170	
(One-half cost on outside streets charged to project		$1,585	
Total cost of Sanitary Sewer			$ 4,086.00
Storm and Drainage Sewer			
Tile Pipe, 10", 449 ft. @ $1.00		$ 499	
Tile Pipe, 8", 899 ft. @ $1.00		899	
Catch Basins, 6 @ $15		90	
Drain Inlets, 20 @ $10		200	
Tile Pipe, 12", 1892 ft. @ $1.00		$1,892	
Tile Pipe, 10", 321 ft. @ $1.00		321	
Tile Pipe, 8", 383 ft. @ $1.00		383	
Manholes, 6 @ $25		150	
Catch Basins, 4 @ $15		60	
		$2,876	
(One-half costoon outside streets charged to project		$1,438	
Total cost of Storm Sewer			$ 3,076.00
Tennis Court and Play Park, Section #5			250.00
Entrance feature, rough wall, cut stone panels			250.00
Street shade trees, 2" Elms, 228 @ $1.25			285.00
Clearing 19.49 acres @ $15			292.35
Overhead administration, 15% construction cost			3,665.75
Total cost of improvements			$28,104.10
Cost of improvements per acre			1,441.95
Cost of improvements per lot			276.66

Assuming the unimproved value of the land to be $1,500 per acre, the average lot with improvements would cost $546.09. The value of the land per frontage foot will be approximately $7.

The unit costs used in these estimates are for construction by administration and not by contract. Quarries nearby furnish the necessary stone and all other materials are bought in large quantities. The cost of curb is omitted from the paving estimate as a dished concrete gutter is used which costs approximately the same as road metal.

BIBLIOGRAPHY

Chapin, Professor R. C., Division of Family Income, 1912

City Club of Chicago, City Residential Land Development Competition. Chicago, 1913

City Planning Conference, Annual Proceedings, Boston, 1910-1916

Culpin, Ewart G., The Garden City Movement Up-To-Date, London, 1914

Eliot, Charles W., Charles Eliot Landscape Architect, Cambridge, 1903

Geddes, Patrick, Cities in Evolution, London, 1915

Mass. Homestead Commission, Boston, Annual Report, 1912-1916

Mass. Homestead Commission, Boston, City and Town Planning Conference, Boston, 1915

Howard, Ebenezer, Garden Cities of Tomorrow, London, 1902

Koch, Hugo, Gartenkunst im Stodtebau, Berlin, 1914

Kolster, Frank, Modern City Planning and Maintenance, New York, 1910

Lange, Willy, Land-und Gartensiedelungen, Leipzig, 1910

Miller, Wilhelm, Mutual Lawn Planning in England, World's Work, November 1908.

Morrell, J. C., Town Planning, Rept. to Min. of Pub. Wks. Victoria, Australia, 1915

National Housing Association, numerous pamphlets on housing by authorities on the subject, New York

National Housing Conference, Proceedings, Vols. 1 to 5, New York, 1911-1916

Nettlefold, J. S., Practical Housing, Letchworth, 1910

Nolen, John, Better City Planning for Bridgeport, Conn., Bridgeport, 1916

Report to City Planning Commission, Boston, 1916

City Planning, New York, 1916

More Houses for Bridgeport, Bridgeport, 1916

Purdom, C. B., The Garden City, London, 1913

Robinson, Charles Mulford, City Planning, New York, 1916

Improvement of Towns and Cities, New York, 1901

Modern Civic Art, New York, 1909

Russell Sage Foundation Homes Co., Forest Hills Gardens Pamphlets, New York, 1912-1916

Stubben, Ing. I., Handbuch der Architektur, Der Stadtebau, Stuttgart, 1907

Taylor, Graham Romeyn, Satellite Cities, Survey, New York, 1912

Waugh, Frank A., Rural Improvement, New York, 1914

"FAIR VIEW"
THE COVNTRY CLVB DISTRICT
KANSAS CITY MISSOVRI

Irving C. Root Landscape Archt. Amherst-Mass. May 14-1917.

FIFTY FIFTH STREET

STREET

1 2 3 4 5

FAIR VIEW COVRT

PARK

GRANT

STRIP

OAK

HOLMES

STREET

FIFTY SIXTH STREET

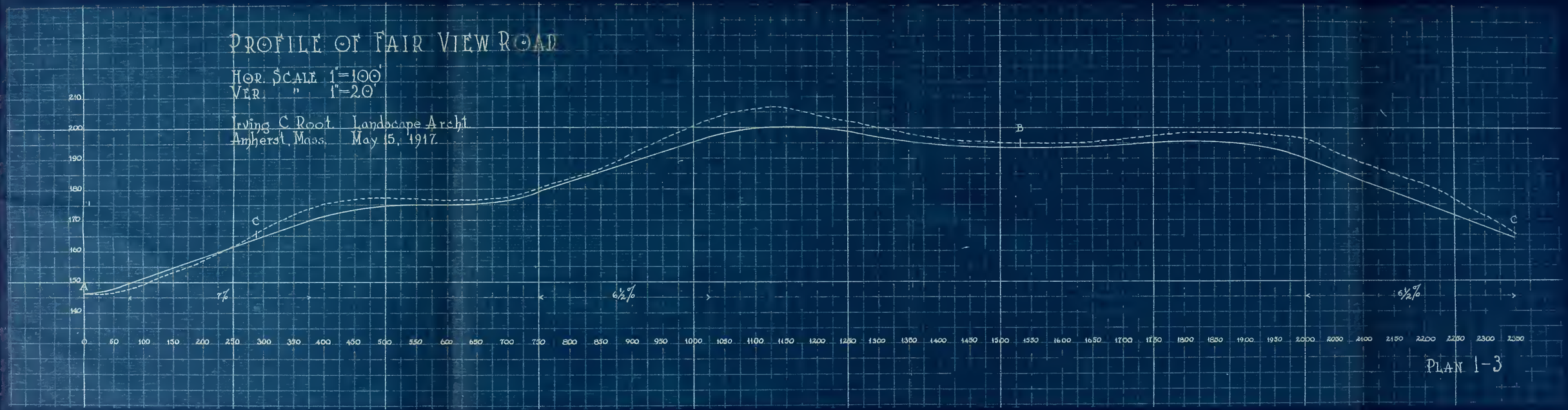
SVBDIVISION STAKING PLAN
FOR A PORTION OF
THE COVNTRY CLVB DISTRICT
KANSAS CITY · MO ·

IRVING C. ROOT ~ LAND · ARCHT · SCALE 1" = 40' AMHERST · MASS · ~ MAY 9 · 1917 ·

PROFILE OF FAIR VIEW ROAD

HOR. SCALE 1"=100'
VER. " 1"=20'

Irving C Root Landscape Archt
Amherst, Mass. May 15, 1917



PLAN 1-3